

Lightweight Structural Battery Systems for CubeSats

Completed Technology Project (2016 - 2018)



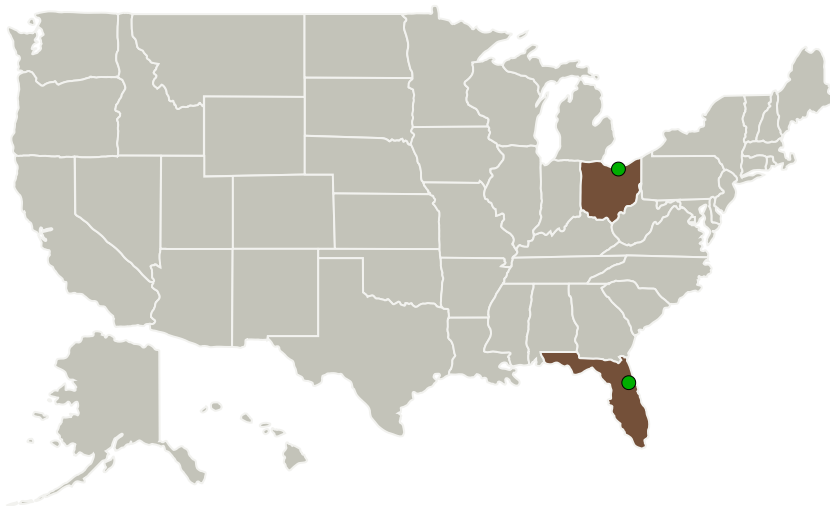
Project Introduction

This project will develop a CubeSat integrated structural battery. With structural elements of graphitic and carbon fiber electrodes in an electrolytic polymer, the multifunctional capacitive energy system can serve as both a lightweight load bearing structure and an electrochemical battery system. Multifunctional material can reduce mass and increase electrical power in highly integrated small spacecraft.

Anticipated Benefits

In addition to reduced mass and increase electrical power in small spacecraft, structural battery materials are applicable to multiple future missions and commercial applications with other highly integrated systems including drones, electric aircraft, robotic exploration systems, and ruggedized sensors.

Primary U.S. Work Locations and Key Partners



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Table of Contents

Project Introduction	1
Anticipated Benefits	1
Primary U.S. Work Locations and Key Partners	1
Organizational Responsibility	1
Project Transitions	2
Project Website:	2
Project Management	2
Technology Maturity (TRL)	2
Target Destination	2

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

University of Miami

Responsible Program:

Small Spacecraft Technology

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Organizations Performing Work	Role	Type	Location
University of Miami	Lead Organization	Academia	Coral Gables, Florida
● Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio
● Kennedy Space Center(KSC)	Supporting Organization	NASA Center	Kennedy Space Center, Florida

Primary U.S. Work Locations

Florida	Ohio
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Project Transitions

▶ **August 2016:** Project Start

✓ **August 2018:** Closed out

Closeout Summary: Tests show structure can be used for energy storage to supplement CubeSat batteries without much increase in mass. Initial performance targets not all achieved but technology shown to have promise

Project Website:

https://www.nasa.gov/directorates/spacetech/small_spacecraft/index.html#.Vt

Project Management

Program Director:

Christopher E Baker

Program Manager:

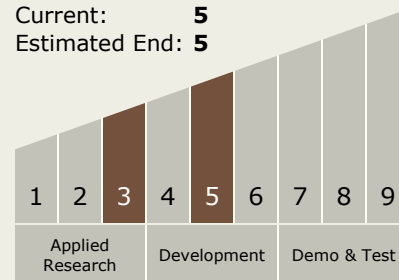
Roger Hunter

Principal Investigator:

Ryan Kakkainen

Technology Maturity (TRL)

Start: **3**
Current: **5**
Estimated End: **5**



Target Destination

Earth